QUANTITATIVE ESTIMATION OF BOTTOM FAUNA IN LAKE MARIUT

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INTRODUCTION

Little informations are gained up till now concerning the distribution of bottom fauna in our Egyptian Delta Lakes. Such studies are however of prime importance in assessing the biological productivity of these shallow brackish water lakes. The only available work is that carried out by Elster *et al* (1960) and by Ezzat (1955) on the benthos of the Nouzha Hydrodrome (1200 feddans) which was previously a part of Lake Mariut.

The present investigation was carried out with the view to study the relation between the magnitude of the standing stock of bottom animals and the fertility of the lake water. The other ecological conditions that may affect the distribution of the different animals are also considered. The physical and chemical aspects of Lake Mariut in addition to primary production were published in previous papers (Aleem & Samaan, 1969 I & II).

Lake Mariut is a brackish shallow water basin adjoining the Mediterranean Coast of Alexandria at latitude 31° 10'' north and longitude 29° 55'' East; with no free exit to the sea. Its surface area amounts to 20,000 feddans (84 km2). The average depth of water is about one meter. The lake receives irrigation water from the cultivated land in the Beheira Province through the Umum Drain. It receives also some sewage at the north margin by the side of karmous District (Fig. 1). The lake is considered as a highly eutrophic lake which sustains a rich flora of phytoplankton. The bottom of the lake is covered mainly with a badly sorted complex type of sand-silt-clay, greyish to black grey in colour (El-Wakeel & Wahby, 1970). Empty shells of *Cardium edule*, gastropods and empty calcarious remains of the tube worm *Mercierella enigmatica* are distributed all over the lake bottom.

The chlorosity of the lake water ranged between 2.5 and 5.6 gm Cl/1 during 1960. Lower values are usually recorded during the autumn and winter months due to the introduction of flood water and it increases gradually during the spring and summer as a result of excessive evaporation of the lake water. The pH of the lake water ranges between 7.8 and 9.35 i.e. it is on the alkaline side. The water temperature usually follows that of the air. Thus, lowest values (about 12°C) are recorded during December and January, while the highest (about 29°C) occur during August.

Methods of Collection and Treatment of the Samples

Two dredgings obtained by a modified Ekman Bottom sampler were taken monthly at each station during 1960, These represent an area equivalent to 1/30 square meter of the upper layer of the bottom deposits containing the animals living in it. The sample is washed in the neld through a small hand net of bolting silk (23 mesh/cm). It is then put in a glass jar and fixed immediately with 6% formaline solution.

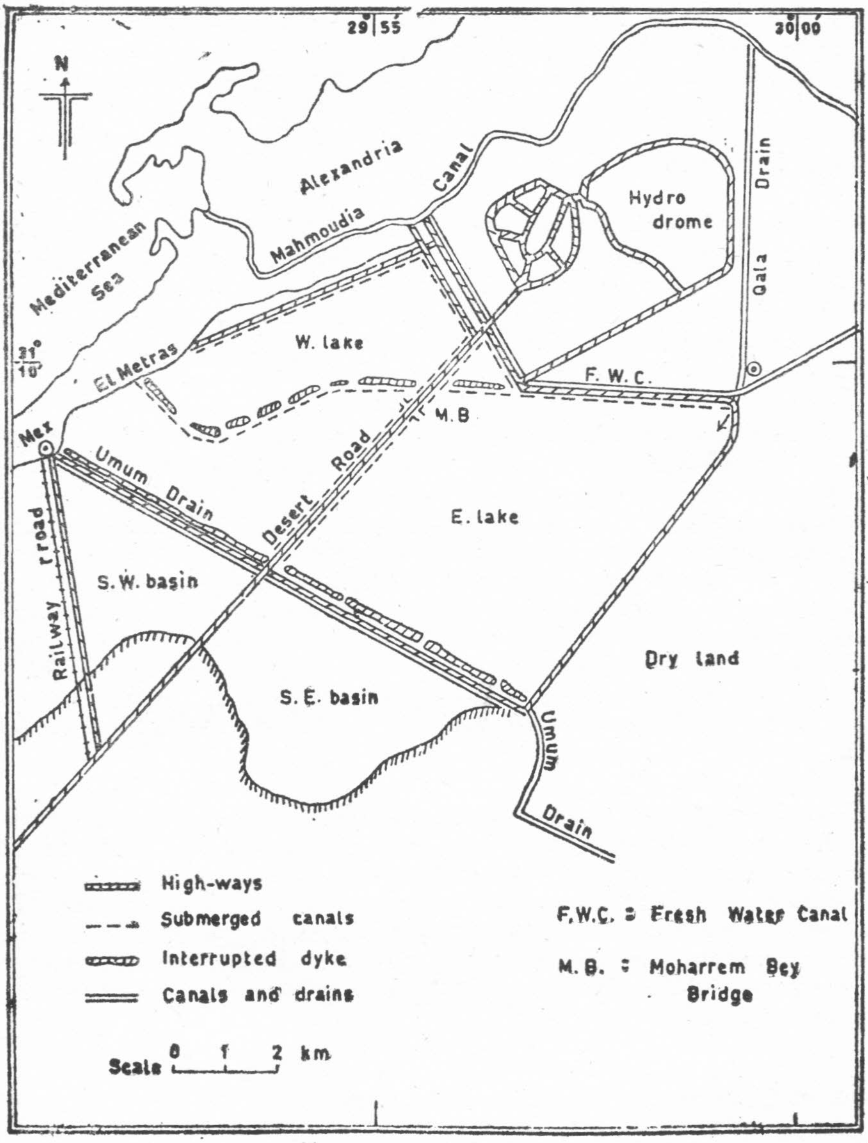

FIG. 1.—Morphometry of the lake.

The sample is washed again in the laboratory through two hand nets, one inside the other. The inner has wider meshes than the outer to help in sorting the microfauna for examination under a binocular microscope. Sorting of the bigger animals (usually more than 5 mm in length) is carried out by takin g smaller portions of the samples under examination in petri dishes with a white back ground. The animals are separated into groups, counted, and each group weighed separately after being left for four minutes to dry on a filter paper. The biomass of the animals is expressed in gm/m2.

Eight stations were chosen as representing the different habitats in the lake (Fig. 2). Stations I and II represent the polluted area situated at the northern margin by the side of Karmous District; stations III, IV, V and VIII represent the bare area; while stations VI and VII represent the *Potamogeton* belt at the southern margin.

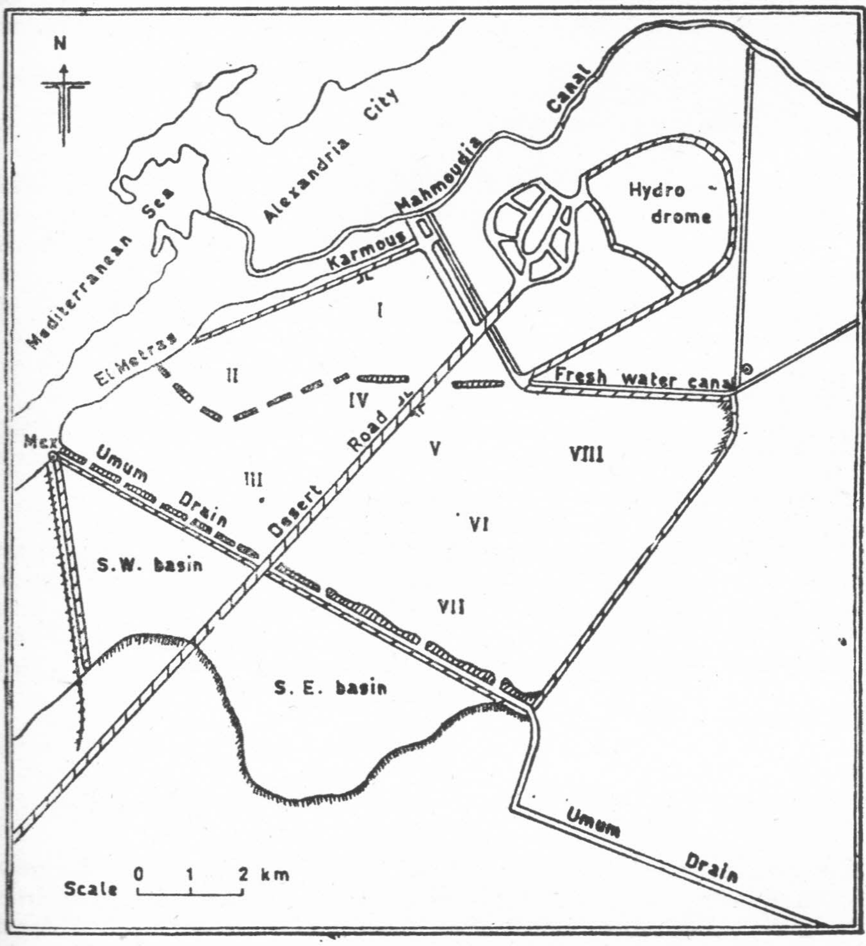

Fig. 2.—Position of stations.

Distribution and Biomass of the Bottom Fauna

The distribution of bottom animals in Lake Mariut varies greatly in the different stations. In this regard the lake can be divided into three distinct habitats as follows :

(a) *Polluted area*:

The bottom at station I is rich in organic matter and the presence of H_2S at this bottom indicates complete depletion of oxygen, and highly reducing conditions. Such habitat was found to be extremely poor in bottom animals throughout the year. Only some ostracods and nematodes are occasionally detected in shallow muds. These seems to be introduced by water currents as they are sometimes also met with among the plankton. The bottom at station II, however, harbours a fauna that is similar to that found at the bare area, but to a much less extent.

(b) *Bare area* :

This area is represented by stations III, IV, V and VIII. The bottom here is devoid of aquatic plants and is away from the effect of sewage. This area seems to be the most suitable habitat in the lake for the survival of bottom animals. Stations V and VIII, being close to the *Potamogeton* belt are; however, less rich in such fauna. The more important bottom animals inhabiting the bare area include :

Nereis diversicolor	(polychaete)
Melania tuberculata	(gastropod)
Corophium volutator	(amphipod)
Corophium orientalis	(")
Gammarus locusta	(")
Gammarus oceanicus	(")
Chironomid larvae	

(c) *Potamogeton belt*:

The Potamogeton belt (stations VI and VII) is unfavourable for the growth of bottom animals. Chironomid larvae which can thrive under reducing conditions are found at the bottom of this belt, while *Gammarus* thrives among the Potamogeton plants and often feeds on the epiphytes attached to the leaves and branches.

The average biomass of the bottom animals in the different stations are shown in Table (1) and Figure (3). The symbol "—ve" used in the tables indicates that no bottom animals are observed.

TABLE 1.—AVERAGE BIOMASS OF THE BOTTOM ANIMALS RECORDED AT THE DIFFERENT STATIONS DURING 1960 (GM/M²)

Habitat	Polluted area		Bare area				Potamogeton belt		Mean
St. No.	I	II	III	IV	V	VIII	VI	VII	
Biomass (gm/m^2)	—ve	23.2	103	94.7	51.8	56.5	1.3	1.9	41.6

Distribution and periodicity of the individual groups

(i) *The polychaete Nereis Diversicolor (Mull)* :

The polychaete *Nereis diversicolor* is the most important bottom animal inhabiting the lake. It constituted about 50% by weight of the biomass of the bottom animals duirng 1960. It is more frequent in the bare area, i.e. stations III, IV, V and VIII and in the partially polluted area (station II). The average numbers and biomass in gm/m^2 of *Nereis* recorded at the different stations during 1960 is shown in Table (2), and Fig. (4A). The percentage composition by weight of the species to the total fauna is also shown in this table.

Larvae of the polychaetes were observed in the zooplankton hauls during the late autumn and early spring, indicating two breeding seasons for *Nereis*. These larvae are accompanied by numerous small individuals of *Nereis* Thus the average numpers of *Nereis* showed a peak in January corresponding to the first breeding season. The second peak was observed during April and May which decreased again gradually till November (Table 3 and Fig. 4B).

2- The gastropod Melania tuberculata

Melania tuberculata represents the second important bottom animal in the lake. It constituted about 34.3 % by weight of the biomass of bottom animals. This species flourishes well in the bare area i.e. at stations III, IV, V and VIII and in the partially polluted area (Table 4 and Figure 5A). It is more common at station IV than in the other stations. This indicates that this gastropod favours localities where the water currents is more rapid, as station IV is affected by water introduced through Moharrem Bey Bridge.

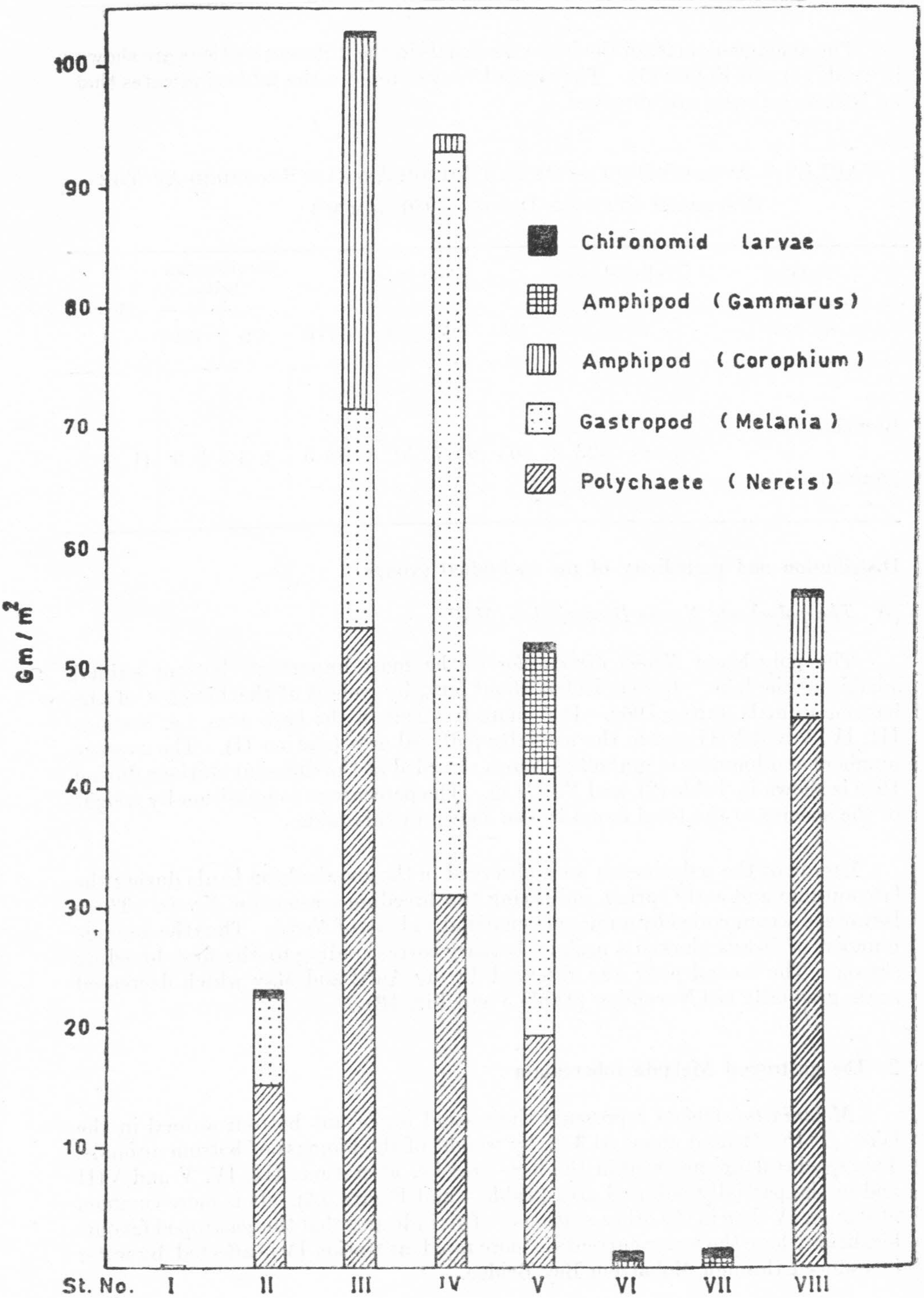

FIG. 3.—Biomass of bottom animals (gm/m²) at the different stations during 1960.

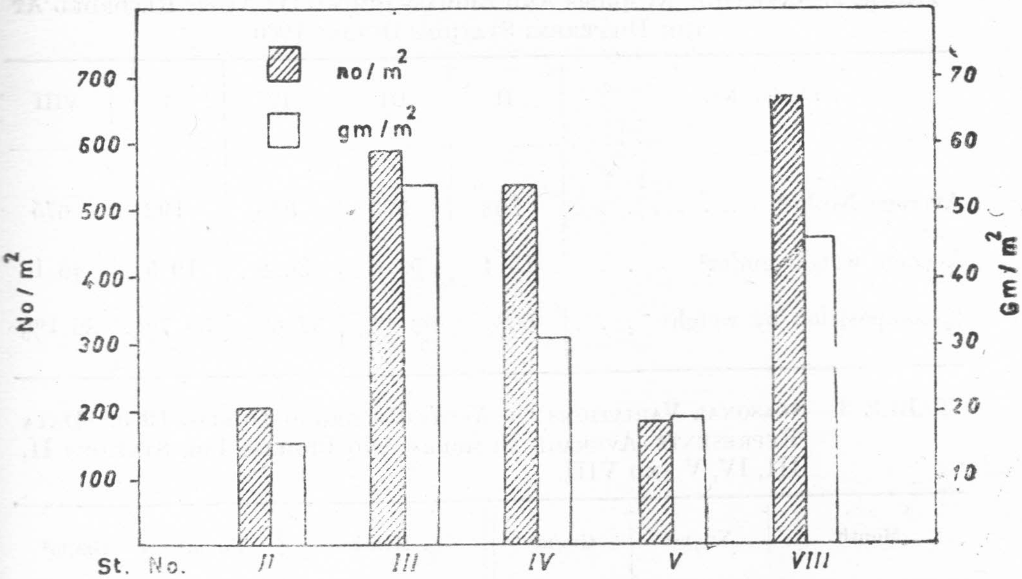

FIG. 4 (A).—Average numbers and biomass of the polychaete *Nereis* jor the different stations during 1960.

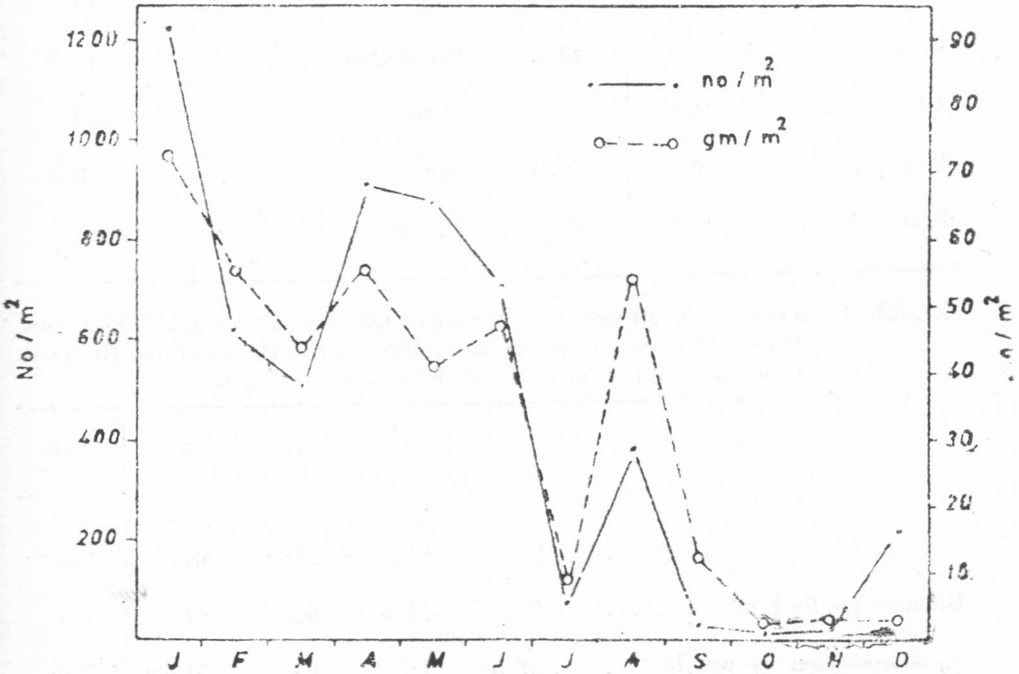

FIG. 4 (B).—Seasonal variations of *Nereis* in no/m² and gm/m² during 1960. Dat represent average values for stations (II-V).

TABLE 2.—AVERAGE NUMBERS AND BIOMASS (GM/M²) OF *Nereis* RECORDED AT THE DIFFERENT STATIONS DURING 1960.

Station No.	II	III	IV	V	VIII
Average No./m²	208	593	540	192	675
Average weight gm/m²	15.4	53.6	30.8	19.5	46.1
% composition by weight . . .	66%	52.4%	32.6%	35.7%	82.1%

TABLE 3.—SEASONAL VARIATIONS OF *Nereis* RECORDED DURING 1960. DATA REPRESENTS AVERAGE NUMBERS AND BIOMASS FOR STATIONS II, III, IV, V AND VIII.

Month	No./m²	Gm/m²	Month	No./m²	Gm/m²
January . . .	1224	73.1	July	72	8.9
February . . .	612	55.4	August	386	54
March	522	44.2	September . .	42	12.5
April	924	55.5	October . . .	18	3
May	882	40.0	November. . .	36	3.2
June	684	47.7	December . .	288	3.1

TABLE 4.—AVERAGE NUMBERS AND WEIGHTS OF MELANIA (GM/M²) FOR THE DIFFERENT STATIONS DURING 1960 AND PERCENTAGE BIOMASS COMPARED WITH THE TOTAL FAUNA DURING 1960.

Station No.	II	III	IV	V	VIII
Average no/m²	280	611	2389	677	139
Biomass gm flesh/m²	7.3	18.6	62.1	21.7	4.4
% composition by weight . . .	31.5%	18%	65.5%	51.8%	7.9%

Table (5) and figure (5B) represent the seasonal variations of *Melania* in the lake, as estimated by the average numbers and biomass of the organisms at the five stations (II, III, IV, V and VIII) throughout the whole year. The abundance of *Melania* remained more or less constant during the winter months of 1960. A small peak was then recorded in May, after which time the numbers of individuals decreased gradually till July. A second high peak was recorded during August which dropped again gradually towards the end of the year.

TABLE 5.—SEASONAL VARIATIONS OF *Melania tuberculata*. DATA REPRESENT AVERAGE NUMBERS AND BIOMASS OF FLESH IN GM/M^2 FOR STATIONS II, III, IV, V AND VIII DURING 1960.

Month	No./m^2	Flesh wt. (gm/m^2)	Month	No./m^2	Flesh wt. (gm/m^2)
January . . .	720	19.1	July	204	7.6
February . . .	544	14.4	August	1904	53.6
March	612	15.6	September	1582	27.5
April	444	12.0	October . . .	840	31.2
May	972	27.4	November . .	828	21.1
June	528	14.4	December . .	576	13.7

3- The amphipods Corophium and Gammarus spp.

Amphipods are represented in the lake by two genera, namely: *Corophîum* and *Gammarus*. These two genera constitute respectively about 11.2 % and 3.4 % of the biomass of bottom animals in the lake. *Corophium* is represented by *C. volutator* and *C. orientalis*. On the other hand *Gammarus* is represented by *G. locusta* and *G. oceanicus*.

The distribution of amphipods in Lake Mariut varies greatly with the different habitats. *Corophium flourishes* mainly at the bare area outside the *Potamogeton* belt and away from the effect of pollution. Thus it was rather frequent at stations III and VIII and less so at the other stations (Table 6 and Fig. 6A). This is due to the fact that *Corophium* browses detritus present in the organic muds as food (Hart, 1930; Ezzat, 1959). Such food is abundant at the bottom of the bare area due to the continuous sedimentation of plankton. On the other hand, *Gammarus* is frequently met with on aquatic plants (Table 7 and Fig. 7A). This amphipod

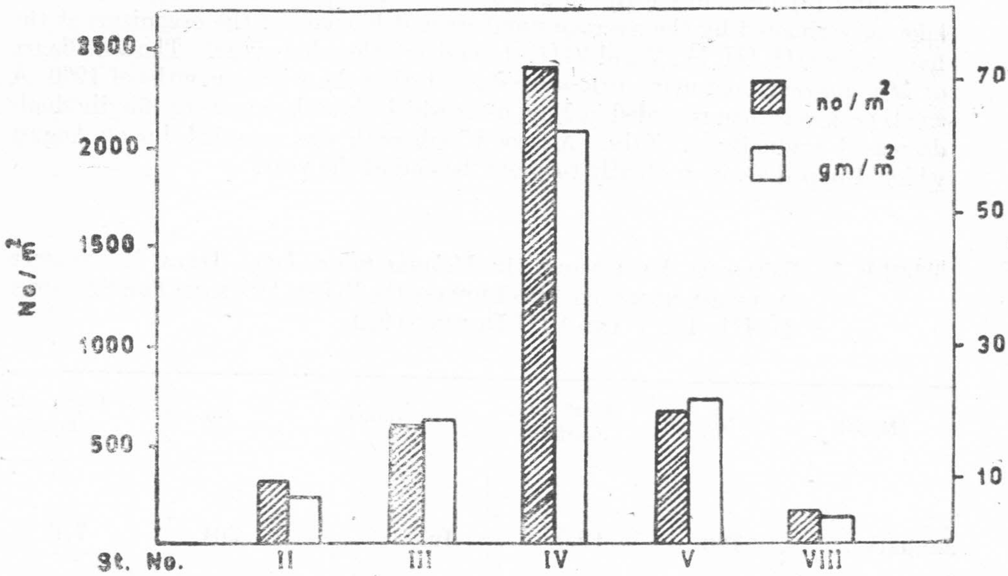

FIG. 5 (A).—Average numbers and biomass of *Melania tuberculata* for the different stations during 1960.

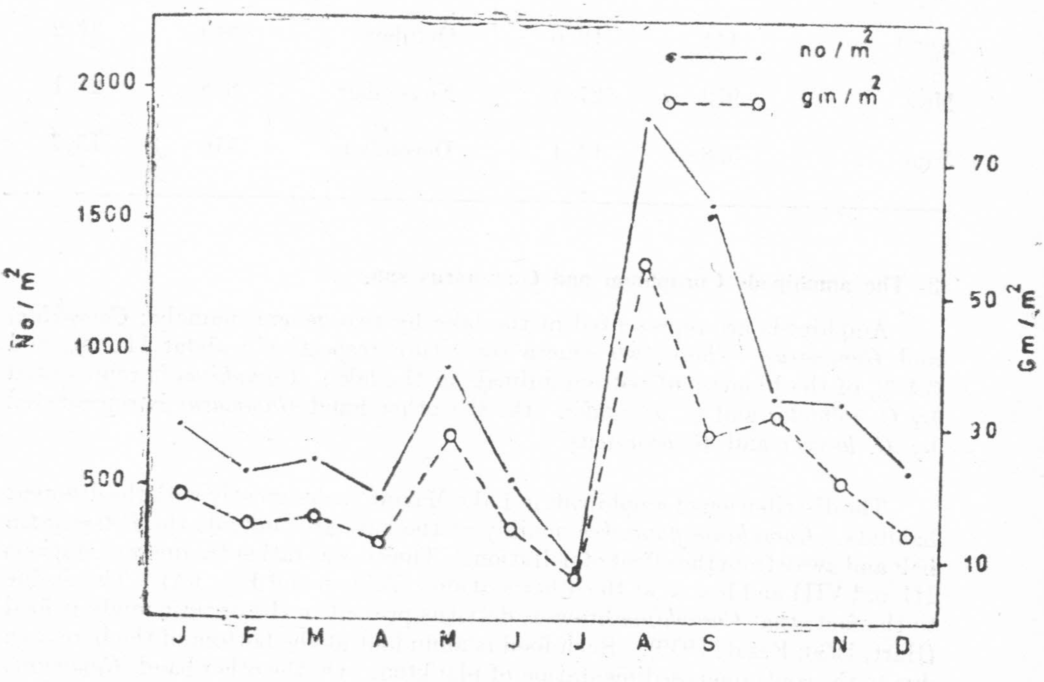

FIG. 5 (B).—Seasonal variations of *Melania* in no/m² and in gm/m² during 1960. Data represent average values for stations (II, III, IV, V & VIII).

feeds upon the epiphytes growing on these plants, and this appears to be the reason why it is frequent at the *Potamogeton* belt and its surroundings. The same amphipod was also recorded in the plankton hauls taken during the winter, indicating the ability of *Gammarus* to survive as a planktonic form. *Gammarus* is less frequent at the bare area and it shows a general tendency to increase in numbers as we approach the *Potamogeton* belt.

TABLE 6.—AVERAGE NUMBERS AND BIOMASS OF COROPHIUM (GM/M^2) RECORDED FOR THE DIFFERENT STATIONS DURING 1960 TOGETHER WITH THE PERCENTAGE COMPOSITION (BY WEIGHT) OF BOTTOM ANIMALS.

Station No.	II	III	IV	V	VIII
Average No. / m^2	—ve	3058	318	20	1019
Biomass in gm / m^2	—	30.7	1.5	0.1	5.1
% composition by wt	—	29.8%	1.6%	0.2%	9.1%

TABLE 7.—AVERAGE NUMBERS AND BIOMASS OF *Gammarus* (GM / M^2) RECORDED FOR THE DIFFERENT STATIONS DURING 1960 TOGETHER WITH THE PERCENTAGE COMPOSITION (BY WEIGHT) OF BOTTOM ANIMALS

Station No.	III	IV	V	VI	VII	VIII
Average No. g/ m^2	5	10	121	15	45	35
Biomass in gm/m^2	0.1	0.2	9.7	0.2	0.6	0.4
% composition by wt	0.1%	0.2%	18.7%	15.4%	31.6%	1.0%

Seasonal variations of Corophium :

Table(8)and Fig. (6B) represent the average numbers and biomass of *Corophium* spp. estimated for the five stations (II, III, IV, V and VIII) during 1960. The figure shows a steady increase in numbers of individuals from January to May. A sudden decrease was recorded during June and July, succeeded by small in August. *Corophium* then disappears from the bottom samples from Septamber to November but appears again in December.

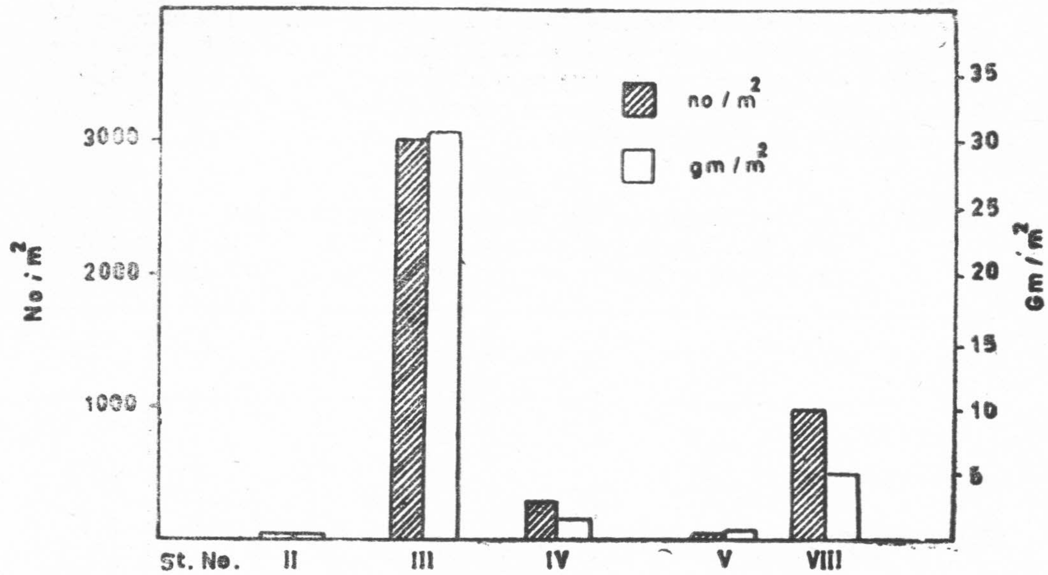

FIG. 6 (A).—Average numbers and biomass of *Corophium* for the different stations during 1960.

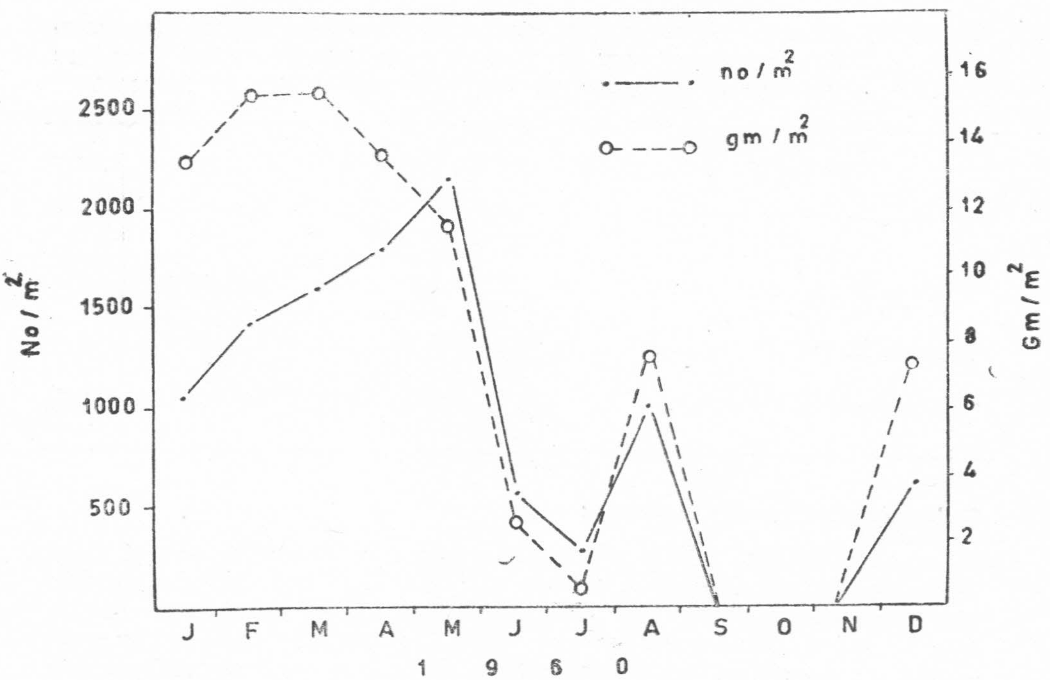

FIG. 6 (B).—Seasonal variations of *Corophium*. Data represent average numbers and biomass for stations (II, III. IV, V & VIII)

TABLE 8.—SEASONAL VARIATIONS OF *Corophium spp.* DATA REPRESENT AVERAGE NUMBERS AND BIOMASS IN GM / M² FOR STATIONS II, III, IV, V AND VIII DURING 1960.

Month	No./m²	Gm/m²	Month	No./m²	Gm/m²
January . . .	1080	13.5	July	222	0.5
February. . .	1404	15.5	August . . .	1020	7.5
March . . .	1644	15.5	September . .	—ve	—
April	1804	13.6	October . . .	—ve	—
May	2286	11.5	November. . .	—ve	—
June	582	2.6	December . .	660	7.4

Seasonal variations of Gammarus :

Table (9) and Figure (7B) represent the average numbers and biomass of *Gammarus* spp. recorded during the successive months of 1960 at stations III, IV, V, VI, VII and VIII. This amphipod appears in the bottom samples in January and increases rapidly during February, reaching a peak in this month. *Gammarus* decreases again rapidly during March and April and disappears from bottom samples between May and October. The same amphipod appears again in small numbers during November and December.

TABLE 9.—SEASONAL VARIATIONS IN NUMBERS AND BIOMASS OF *Gammarus* FOR STATIONS (III—VIII) DURING 1960.

Month	No./m²	Gm/m²	Month	No./m²	Gm/m²
January . . .	10	0.2	July	—ve	—
February. . .	275	8.0	August	—ve	—
March	191	10 1	September .	—ve	—
April	20	0.4	October	—ve	—
May	—ve	—	November. . .	10	0.2
June	—ve	—	December . .	30	0.7

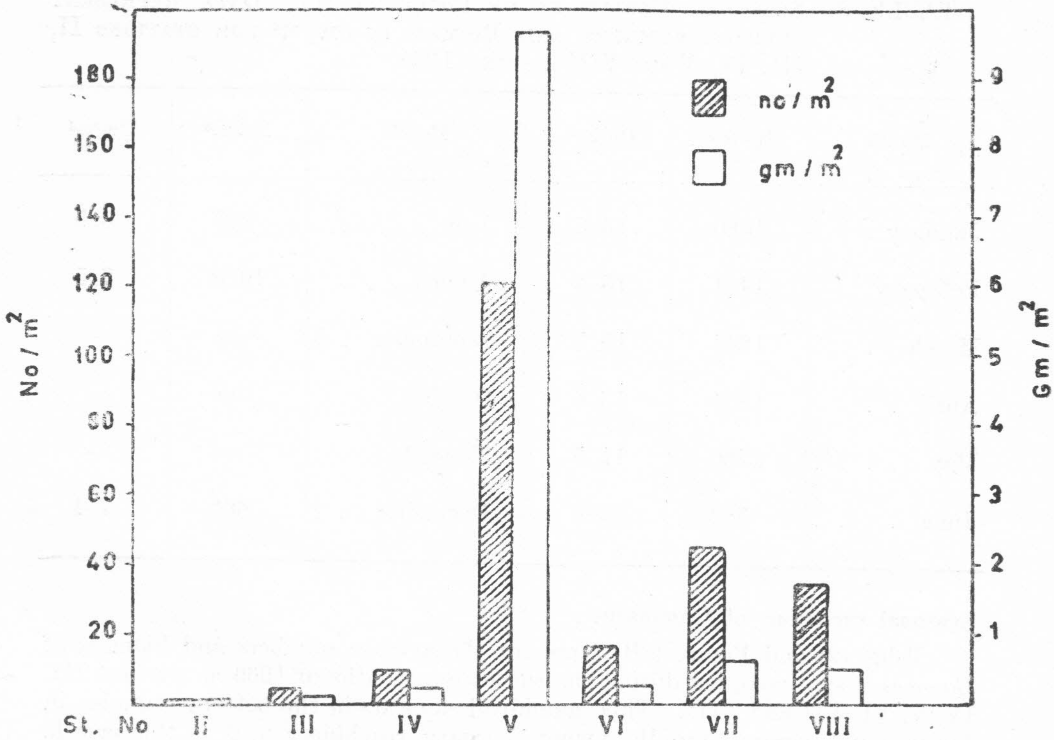

FIG. 7 (A).—Average numbers and biomass of *Gammarus* for the different stations during 1960.

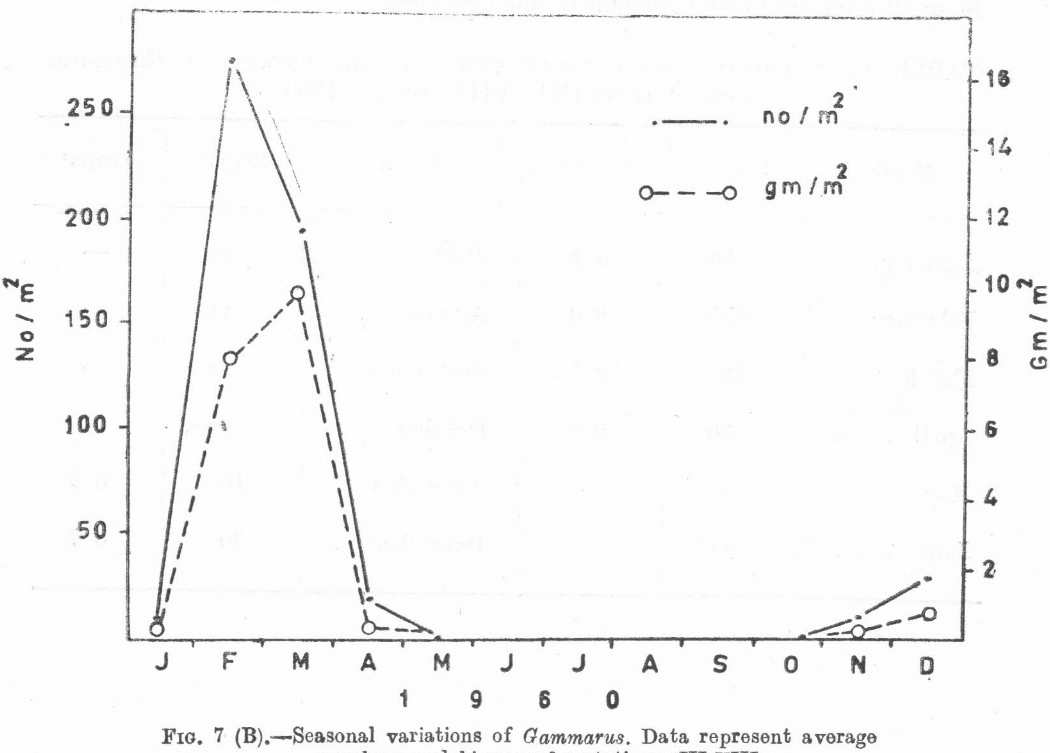

FIG. 7 (B).—Seasonal variations of *Gammarus*. Data represent average numbers and biomass for stations (III-VIII)

4-Chironomid larvae :

These are the larvae of aquatic diptera (midges) that are known to inhabit different types of fresh and brackish waters. They are chiefly herbivorous and furnish also a direct food supply for larger animals including fishes. Chironomid larvae constitute about 1.2 % by weight of the biomass of the bottom animals in Lake Mariut.

Chironomid larvae are characteristic members of the littoral zone of both oligotrophic and eutrophic lakes (Mundie, 1955). These larvae are red in colour due to the presence of haemoglobin pigments in the blood plasma, thus enabling the animal to stand water poor in oxygen. In Lake Mariut they are found chiefly in the plant belt, where they constitute about 84.3% and 76.2% by weight of the bottom fauna recorded respectively at stations VI and VII during 1960 (Table 10 and Fig. 7A).

TABLE 10.—AVERAGE NUMBERS AND BIOMASS OF CHIRONOMID LARVAE RECORDED AT THE DIFFERENT STATIONS DURING 1960 TOGETHER WITH THE PERCENTAGE COMPOSITION BY WEIGTH OF BOTTOM ANIMALS

Station No.	II	III	IV	V	VI	VII	VIII
Average No./m²	85	—ve	15	165	270	323	103
Biomass in Gm/m²	0.5	—ve	0.1	0.8	1.1	1.3	0.5
% Composition by wt . .	2%	—	0.1%	1.5%	84.3%	76.2%	0.9%

As shown in Table (11) and Fig. (7B), Chironomid larvae display a maximum distribution during the winter and early spring. The numbers decrease quickly during May and remain low until November. Chironomid larvae start to increase again in December.

5- Other bottom animals of rare occurrence :

Two other forms of bottom animals of rare occurrence have been recorded in Lake Mariut, but not incoluded in the quantitative estimation of animals. These are the barnacle *Balanus improvisus* (Darwin) and the polychaete *Mersierella enigmatica* (Faurel). The distribution of these animals in the lake can be summarized as follows :

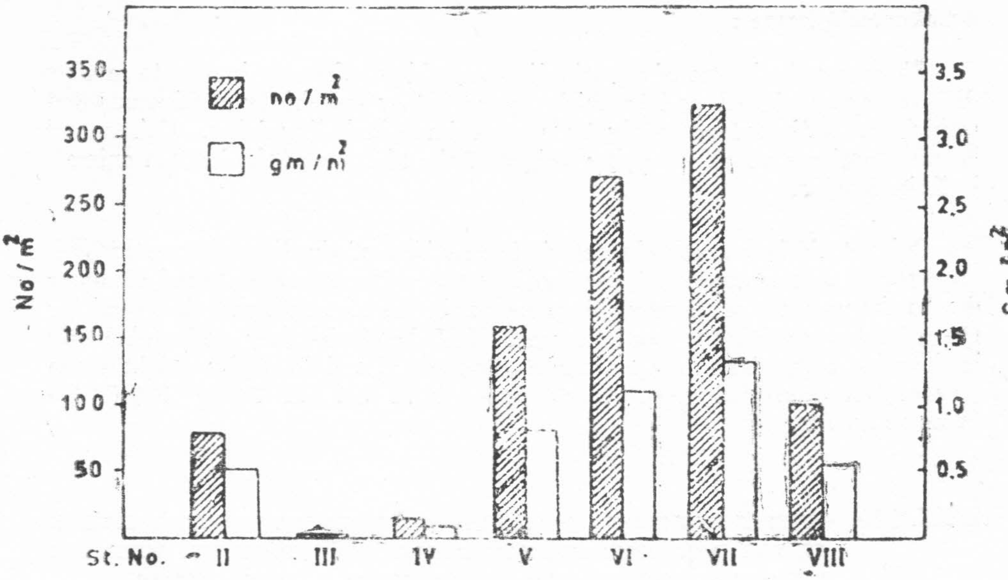

FIG. 8 (A).— Average numbers and biomass of chironomid Larvae for the different stations during 1960.

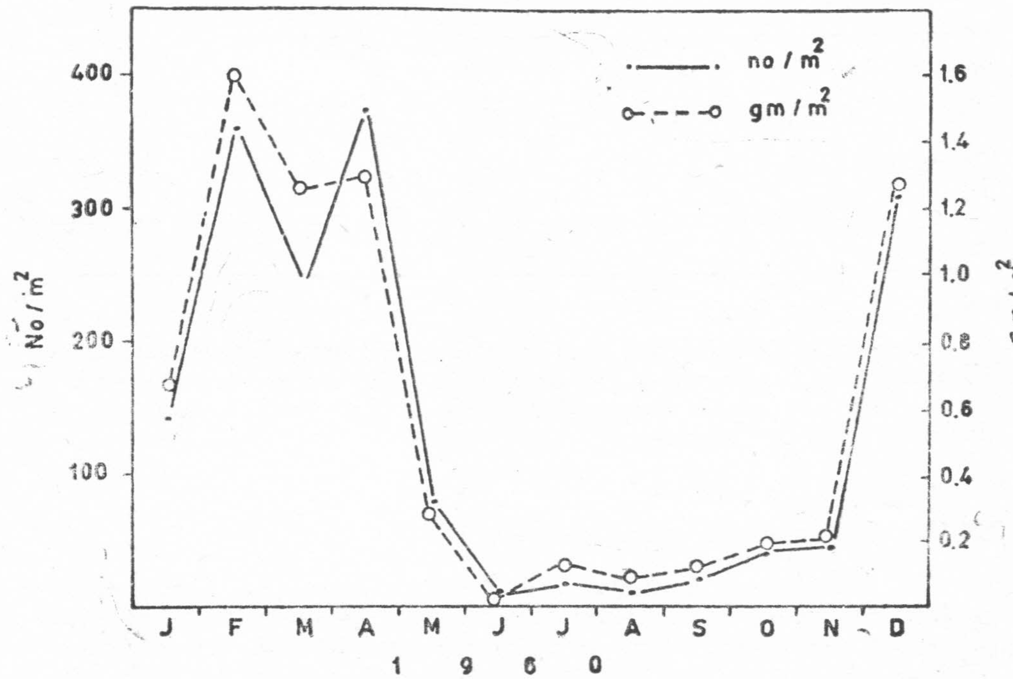

FIG. 8 (B).—Seasonal variations of chironomid Larvae. Data represent average numbers and biomass for stations (II-VIII) during 1960.

(a) *Balanus improvisus* :

Although the nauplius larvae of *Balanus* are more or less frequent in the plankton, yet the adult animal has scarcely been met with among the bottom fauna. The same observations has also been made by the authors in Lake Burollus. In both lakes the *Balanus* usually accumulates in patches on hard substratum and shows very uneven distribution. The submerged stems of *Phragmites* growing in the lake margins furnish a good substratum for the growth of *Balanus*. Balanus is found also to grow on the empty shells of *Cardium*.

(b) *The polychaete worm Mercierella enigmatica* :

Calcareous remains of this tube worm are found dispersed all over the lake bottom. However, the living animal is rare. Small patches are found attached to *Phragmites* or *Potamogeton* stems, also on concrete embankments in the lake. The paucity of this worm in Lake Mariut nowadays may be attributed to the decreasing salinity of the lake. It has been mentioned by Edmondson (1959) that *Mercierella enigmatica* can survive in both fresh and sea water, but it reproduces only in brackish conditions.

TABLE 11.—SEASONAL VARIATIONS IN NUMBERS AND BIOMASS OF CHIRONOMID LARVAE IN LAKE MARIUT. DATA REPRESENT MAEN VALUES FOR STATIONS (IVIII) DURING 1960.

Month	No./m²	Gm/m²	Month	No./m²	Gm/m²
January . . .	146	0 66	July	21	0 13
February . .	36	1.61	August	13	0.08
March	241	1125	September . .	21	0.11
April	377	1.29	October . . .	39	0 18
May	77	0.28	November. . .	43	0.19
June . . .	9	0.04	December . .	309	1.25

Other microfauna :

Microscopic examination of bottom muds indicates the presence of several microorganisms in the lake bottom. Many of these apear at one time or the other in the plankton, particularly as a result of stirring up of the bottom deposits by wind. The distribution of the more important microorganimss is summarized as follows :

Ostracoda: *Cyprideis littoralis* (Brady) is a tychoplanktonic form of rare occurrence, whether in the plankton or in the bottom samples of the lake. They are mostly confined to the bare area and to a lesser extent to the *Potamogeton* belt and in the polluted area.

Free living nematodes: The free living nematodes present in the lake are also tychoplanktonic. They are represented by few numbers both in the plankton as well as in the bottom samples. They seem to be rather frequent in the *Potamogeton* belt as well as in the bare area.

Oligochaetes: A few scattered individuals of oligochaetes, mostly belonging to Naididae have been recorded in the *Potamogeton* belt and its surroundings during the winter and spring. Sometimes also such organisms are met with in the plankton.

Foraminifera: The foraminifera in Lake Mariut is mainly composed of the genus *Ammonia*. The genera *Elphidium* and *Triloculina* are rarely recorded (El-Wakeel *et al*, 1970).

The fact that the last mentioned groups of microfauna may be of particular importance in the food cycle at the bottom can not be denied. They feed mostly on bacteria and detritus; their ecological relationship must also be understood. This, however, would require a separate investigation to be undertaken in future.

DISCUSSION

Bottom fauna represents and important link in the food cycle of aquatic habitats. Thus, bottom animals feed mostly upon detritus including sedimentary phytoplankton and zooplankton organisms. These bottom animals in turn are devoured by other animals including fish. Bottom fauna together the bactria- and fungi add to the mineralization of particulate organic matter which is further broken down by other forms of bacteria to inorganic constituents available to plants.

Since Lake Mariut is very shollow (about on meter depth), its entire bottom belongs to the littoral zone. It was mentioned by many investigators that such shallow lakes support the most productive benthic fauna (Muttkowski, 1918; Baker, 1918; Eggleton, 1935, Welch, 1952, etc.). It has been found that the biomass of bottom fauna inhabiting Lake Mariut is affected greatly by the physical conditions prevailing at the bottom, as well as by the availability of their food requirements. Thus, although the polluted area is rich in phytoplankton, yet the benthos there is rather poor. This is due to the reduced conditions prevailing at the bottom. The same conditions are more or less observed in the *Potamogeton* belt. Chironomid larvae which can thrive in water poor in oxygen represent the main bottom animals in the plant belt. *Gammarus* is also recorded thriving among the *Potamogeton* plants grazing on epiphytes. On the other hand the bare area appears to be the most suitable habitat for the survival of bottom animals. The more important bottom animals inhabiting this area include *Neries diversicolor, Melania tuberculata, Corphium* spp., *Gammarus* spp. and chironomid larvae. Other forms of rare occurrence comprise *Merciere lla* enigmatioa and *Balanus improvisus.*

The average water temperatur ranges between 12°C and 29°C. Lowest values are usually recorded during January while the highest are recorded during August. Between these two extremes the water temperature increase gradually- during the spring and summer months but decreases again gradually throughout the rest of the year. The effect of temperature variations on the succession of bottom animals varies with the different forms. Thus the polychaete *Nereis* and the amphipod *Corophium* are more abundant during the winter and spring, while the gastropod *Melania* shows its maximum distribution during the summer. *Gammarus* appears only in the bottom samples during the period from November till April with a peak in Febrauary. Chironomid larvae show also maximum distribution during the autumn and winter months but they persist by few individuals throughout the rest of the year.

The chlorosity of water ranges between 2.5 and 5.6 gm. Cl/1. Lower values were recorded during the autumn and winter months due to the introduction of flood water and it increased during the summer as a result of excessive evaporation. Chlorosity variations seem to have no pronounced effect on the distribution of bottom fauna in the lake. It appears, however, that the decrease of *Mercierella enegmatica* in the lake is due to the decreased salinity of the lake water during the last years.

In general, lake Mariut sustains the highest standing stock of bottom fauna as compared wiht the other inland waters in Egypt. This is attributed to the high fertility of the lake water. Thus the biomass of the bottom animals at the bare area in Lake Mariut is 76.5 gm/m², while that of Lake Burollus amounted to 19 gm/m² during 1963 (unpublished data obtained by Samaan). On the other hand, the biomass of the bottom fauna in the Nouzha Hydrodurome was estimated as about 6.3 gm/m² (compiled from the reports of the Hydrobiological Institute of Alexandria).

SUMMARY

1.—The distribution of bottom animals in Lake Mariut varies greatly according to the different habitats. The highly polluted area (station 1) is extremely poor in bottom animals, while station II (less polluted) harbours a fauna similar in composition to that present in the bare area but in smaller numbers. The bare area is the most suitable habitat for the survival of benthos. The *Potamogeton* belt was found to be unfavourable for the growth of bottom animals.

2.—The polychaete *Nereis diversicolor* is the most important bottom animal inhabiting the lake and it constitutes about 49.9% of the biomass of bottom animals. It shows a peak in January and in April.

3.—The gastropod *Melania tuberculata* constitutes about 34.3% of the biomass of the bottom fauna. It is widely distributed in the bare area. *Melania* is recorded all the year round with maximum distribution on August and September.

4.—The amphipod *Corophium constitutes about* 11.2% of the biomass of bottom animals. It is recorded only in the bare area with a maximum distribution at station III.

5.—*Gammarus* comprises about 3.4% of the biomass of the bottom animals in the lake. It appears in the bottom samples from November to April of the next year, with a peak in February.

6.—Chironomid larvae constitute about 1.2% of the biomass of bottom animals in the lake. They form the mean benthos at the *Potamogeton* plant belt and thus constitute about 84.3% and 76.2% of the biomass of bottom animals at stations VI and VII respectively.

7.—Two other forms of bottom animals of rare occurrence comprise the barnacle *Balanus improvisus and* the tube worm *Mercierella enigmatica.* These animals show uneven distribution and they usually grow on hard bottoms and on stems of phragmites.

8.—Microscopic examination of the bottom muds indicates the presence of several microorganisms in the lake bottom which occasionally appear in the plankton hauls. These include: the ostracod *Cyprideis litoralis,* free living nematodes, oligochaetes and foraminifera.

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